

**STUDIES IN PANAMA CULICOIDES (DIPTERA, HELEIDAE). IX. TWO NEW SPECIES RELATED TO LEONI BARBOSA AND REEVESI WIRTH.**

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There are five closely related species of *Culicoides*, subgenus *Occacta*, *debilipalpis* group, which have the following characters in common: size small, wing 0.63–0.75 mm. long; wing broad at the apex with very sparse macrotrichia; one large, round, distal pale spot in cell R<sub>5</sub> nearly filling the space between the anterior wing margin and vein M<sub>1</sub>; the two post-stigmatic pale spots in cell R<sub>5</sub> nearly in line transversely and usually broadly fused, with the posterior spot extending nearly or quite to vein M<sub>1</sub>, one pale spot in distal part of cell M<sub>2</sub> and one in distal portion of anal cell; antennal segments with a characteristic repetition of increasing lengths in the proximal and distal series, segment XI thus slightly shorter than segment X; distal sensory tufts present on segment III, and VII or VIII to X; second palpal segment usually longer than third segment and one pyriform spermatheca present.

In this group are *leoni* Barbosa from Ecuador, *benarrochei* Ortiz and Mirsa from Venezuela, *reevesi* Wirth from California, and the two new species from Panama and Honduras here described. We take this opportunity to offer redescriptions of the females of *leoni* and *reevesi* and to describe the hitherto unknown male of *leoni*.

There are several terms the precise definitions of which are essential to the descriptions. Wing length is measured from the basal arculus to the wing tip; we use the Tillyard modification of the Comstock-Needham terminology of wing veins, whereby the two branches of the anterior fork become veins M<sub>1</sub> and M<sub>2</sub> and the branches of the posterior fork are called M<sub>3+4</sub> and Cu<sub>1</sub>. The antennal ratio is obtained by dividing the combined lengths of the last five segments by those of the preceding eight. The length of the spermatheca includes the sclerotized portion of the duct. Our measurements are of single specimens unless followed by values

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in parentheses, in which case the values are "mean (minimum-maximum, n = number of measurements)."

The types of the two new species here described are deposited in the U. S. National Museum in Washington. Unless otherwise stated, all specimens were collected in light traps in Panama by the junior author.

*Culicoides leoni* Barbosa

(Figure 2)

*Culicoides leoni* Barbosa, 1952, Nov. Subs. Conhec. *Culicoides* Neotr. p. 17 (female; Ecuador; fig. wing, palpus).

*Characters of Female.* Length of wing 0.63 (0.56-0.66, n = 5).

Head: Eyes moderately separated, with short interfacetal hairs. Antenna with flagellar segments in proportion of 12:8:10:11:12:12:13:14:10:10:13:15:22, antennal ratio 0.75 (0.72-0.78, n = 5); distal sensory tufts present on segments III, VII-X. Palpal segments in proportion of 7:16:15:6:8, third segment moderately swollen, 1.7 (1.5-1.9, n = 5) times as long as greatest breadth, with a deep sensory pit opening through a small pore. Mandible with 12 (12-14, n = 5) teeth.

Thorax: Mesonotum seen in slide mounted specimens apparently without conspicuous pattern, dark brown. Scutellum, postscutellum and pleuron dark brown. Legs brown; trochanters and extreme bases of femora, apices of fore and mid femora and bases of all tibiae, yellowish; hind tibial comb with 4 spines, the one nearest the spur longest, half as long as basitarsus.

Wing: Pattern as figured, one large post-stigmatic pale spot in cell  $R_5$  usually extending caudad to vein  $M_1$ ; distal pale spot in cell  $R_5$  large and usually rounded, nowhere meeting margins of cell; one pale spot in cell  $M_1$  near base; one continuous pale spot in cell  $M_2$  between medial and mediocubital forks, only one pale spot in apex of cell; one large pale spot in cell  $M_4$  and one large pale spot filling apex of anal cell. Macrotrichia sparse, only a few on distal third of wing; costa extending to 0.55 of distance to wing tip. Halter whitish.

Abdomen: dark brown; cerci yellowish. Spermatheca one, pyriform, measuring 0.042 by 0.031 mm., the duct sclerotized only a short distance.

*Male Genitalia.* Ninth sternum with moderately deep caudo-median excavation, the posterior membrane bare; ninth tergum broad at apex, with long, slender, apicolateral processes. Basistyle with ventral root foot-shaped, with a very prominent posterior heel; dististyle nearly straight, slender, with bent, pointed tip.

Aedeagus with rounded anterior arch, the basal arms slender and curved, distal portion slender, with rounded tip. Parameres each with basal knob, stem slender at base, swollen at the abruptly bent mid portion, abruptly twisted distad, with short apical point bearing two or three fine subapical barbs.

*Distribution*—Ecuador.

*Specimens examined*—ECUADOR: Macas, Santiago, Zamora, 6 February 1955, R. Levi-Castillo, 4 females. Echianda, Bolivar, 25 February 1955, R. Levi-Castillo, 1 female. Milagro, San Miguel, Guyas, May 1955, R. Levi-Castillo, 1 male.

*Discussion*—A peculiar feature which greatly aids in the recognition of this species is the caudal extension of the post-stigmatic pale spot in cell  $R_5$  usually to meet vein  $M_1$ , this spot not extending so far caudad in the related species.

### **Culicoides glabellus** n. sp.

(Figure 1)

*Characters of Female.* Length of wing 0.68 (0.66–0.76,  $n = 11$ ) mm.

Head: Eyes narrowly separated, with short interfacetal hairs. Antenna with flagellar segments in proportion of 15:11:12:13:13:13:14:17:15:15:18:18:29, antennal ratio 0.91 (0.88–0.95,  $n = 8$ ); distal sensory tufts present on segments III, VIII–X. Palpal segments in proportion of 6:16:15:7:8; third palpal segment slightly swollen, 1.8 (1.7–2.1,  $n = 11$ ) times as long as greatest breadth, with small deep sensory pit. Mandible with 12 (11–13,  $n = 13$ ) teeth.

Thorax: Mesonotum very dark brown, with faint pattern as figured, consisting of a sublateral pair of blackish bands. Scutellum uniformly dark brown; postscutellum and pleuron dark brown. Legs dark brown; fore and mid femora with subapical, all tibiae with sub-basal and hind tibia with apical, narrow whitish rings; hind tibial comb with 4 ( $n = 10$ ) spines, the longest one next to the spur.

Wing: Pattern as figured, post-stigmatic pale spot in cell  $R_5$  only rarely incompletely divided into two separate spots, these located at same distance from base of wing, the spot never extending caudad as far as vein  $M_1$ ; pale spot in apex of cell  $R_5$  large and rounded, usually filling most of the space between anterior wing margin and vein  $M_1$ ; two pale spots in cell  $M_1$ , only one pale spot each in apices of cell  $M_2$  and anal cell, pale spots present lying in front of mediocubital fork and behind medial fork. Macrotrichia

very sparse in extreme apices of cells  $R_5$ ,  $M_1$  and  $M_2$ ; costa extending to 0.65 of wing length, wing broader than usual on distal half. Halter whitish.

Abdomen dark brown, cerci yellowish. Spermatheca one, pyriform, measuring 0.059 by 0.038 mm., with long sclerotized duct.

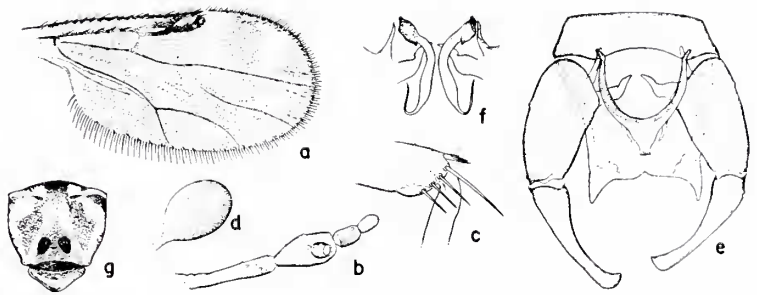
*Male Genitalia.* Ninth sternum with very shallow, broad, caudomedian excavation; the posterior membrane bare; ninth tergum short, the apex distinctly notched in middle with prominent, triangular, apicolateral processes. Basistyle with short ventral and dorsal roots, the posterior heel not developed on ventral root; dististyle slender, only slightly curved. Aedeagus with broad, distally rounded, basal arch, the basal arms distinctly curved; distal stem broad at base with a pair of hyaline, sublateral, rounded lobes, the median point slender and rounded at tip. Parameres each with large basal knob, stem slender and gradually curved on basal portion, more swollen toward apex of straight portion, ventral lobe absent, apex abruptly tapered to simple filiform tip directed ventrad.

Holotype female, Almirante, Bocas del Toro Province, Panama, 18 March 1953, F. S. Blanton, light trap (type no. 63129, U.S.N.M.). Allotype, same data except date November 1952. Paratypes, 12 males, 52 females: PANAMA—Bocas del Toro Province: 6 males, 26 females, Almirante, October 1952 to March 1953. Canal Zone: 1 female, Camp Butler, 20 January 1954, G. Field; 2 males, 21 females, Mojinga Swamp, 18 December 1951, 24 June 1952, 13 October 1952, 15 November 1953. HONDURAS—1 male, 4 females, Lancetillo, 13 August, 23 December 1953, 27, 29 January 1954, P. Galindo, light trap. NICARAGUA—1 male, Guapinola, 29 October 1953, P. Galindo, light trap. TRINIDAD—1 male, Grandwood Navy Base, 20 October 1955, T. H. G. Aitken, light trap; 1 male, Port of Spain, June 1953, 25 Med. Det., U. S. Army, light trap.

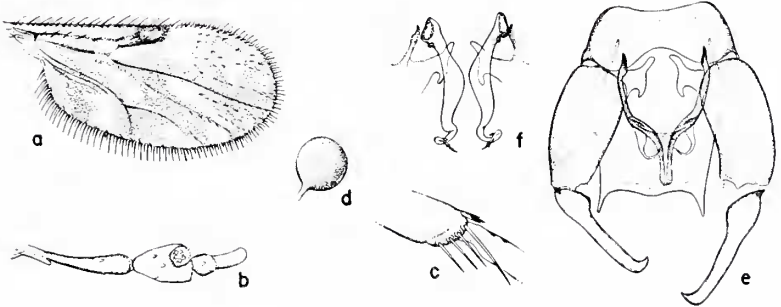
#### EXPLANATION OF PLATE IV

Fig. 1. *Culicoides glabellus* (from Almirante, Panama). Fig. 2. *Culicoides leoni* (from Ecuador; ♀ from Macas, ♂ from Milagro). Fig. 3. *Culicoides fieldi* (from Lancetilla, Honduras). Fig. 4. *Culicoides reevesi* (from Kern County, California).

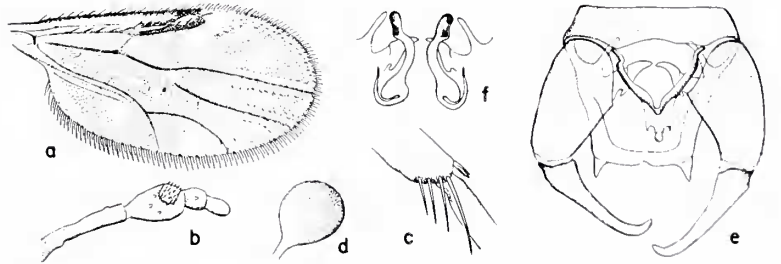
a, female wing; b, female palpus; c, apex of hind tibia showing spur and comb of tibial spines, female; d, female spermathecae, e, male genitalia, paramers omitted; f, male parameres; g, thoracic color pattern, female. (Drawings by Thomas M. Evans.)



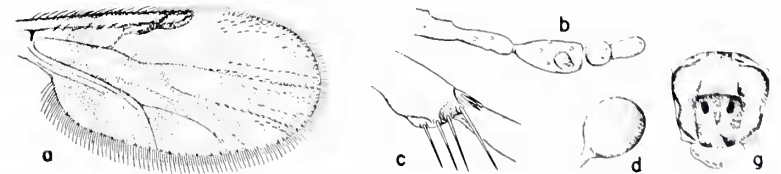
1. GLABELLUS



2. LEONI



3. FIELDI



4. REEVESI

McEvoy

*Discussion*—In general appearance, size and in wing markings *glabellus* is practically identical with *leoni* Barbosa and *gabaldoni* Ortiz. There are two spermathecae, however, in *gabaldoni*, and *leoni* differs in having an antennal ratio of only 0.75 and sensoria present on segment VII as well as on III, VIII–X. All three species have the remarkable repetition of increasing lengths of segments in the antennal series with segments XI always shorter than X. The male genitalia of *glabellus* can be readily distinguished by the gradually curving base of the paramere, the stem swollen at the distal part of the straight portion, beyond which the paramere tapers rapidly to a simple, filamentous tip.

### **Culicoides fieldi** n. sp.

(Figure 3)

*Characters of Female.* Length of wing 0.72 (0.66–0.76,  $n=9$ ) mm.

Head: Eyes contiguous, with long interfacetal hairs. Antenna with flagellar segments in proportion of 14:11:13:14:13:13:14:17:15:15:18:18:19, antennal ratio 0.85 (0.80–0.92,  $n=6$ ); distal sensory tufts present on segments III, VIII–X. Palpal segments in proportion of 7:15:15:7:7, third segment moderately swollen, 1.8 (1.7–1.9,  $n=8$ ) times as long as greatest breadth, with a small, deep, sensory pit. Mandible with 12 (11–13,  $n=11$ ) teeth.

Thorax: Mesonotum (only slide mounted specimens available) apparently without prominent pattern, dark brown. Scutellum, postscutellum and pleuron dark brown. Legs brown, fore and mid femora with very faint subapical pale rings, all tibiae with sub-basal and hind tibia with apical, distinct pale rings; hind tibial comb with 4 ( $n=10$ ) spines, the longest one nearest the spur.

Wing: Pattern as figured; pale spot over r-m crossvein small; poststigmatic pale spots in cell  $R_5$  more or less separated into two, distinct, small round spots, the posterior one located distinctly proximad of the anterior one; distal pale spot in cell  $R_5$  small and round, located in center of cell; two pale spots in cell  $M_1$ ; only one pale spot each in apices of cells  $M_2$ ,  $M_4$  and anal cell; pale spot usually present behind medial fork but no pale spot in front of mediocubital fork. Macrotrichia very sparse on distal fourth of wing, none located proximad of level of end of costa; costa extending to 0.60 (0.59–0.62,  $n=9$ ) of distance to wing tip. Halter infuscated.

Abdomen: Blackish, cerci yellowish. Spermatheca one, pyriform, measuring 0.057 by 0.038 mm., the base of the duct sclerotized a considerable distance.

*Male Genitalia.* Ninth sternum very narrow, caudomedian excavation not developed, the posterior membrane not spiculate; ninth tergum short with truncate apex, apicolateral processes long and slender. Basistyle with ventral lobe large and foot-shaped, the posterior heel pointed, dorsal root slender; dististyle long and slender with hooked apex. Aedeagus with basal arch extending to more than half of total length, mesal apex of arch narrow, the basal arms nearly straight and well sclerotized; distal portion tapering to a slender rounded tip, with a subapical, lateral pair of sclerotized points arising near juncture with the arch. Parameres each with small basal knob, stem slender, abruptly bent near base, the straight portion comparatively short with a long ventral lobe distad, beyond which the paramere is very slender, tapering rapidly to a simple fine-pointed tip.

Holotype female, Lancetilla, Honduras, 27 November 1953, P. Galindo, light trap (type no. 63130, U.S.N.M.). Allotype male, same data but collected 3 July 1953. Paratypes, 13 males, 17 females: HONDURAS, 3 males, 7 females, same data as type, but dates 3 July 1953 to 29 January 1954. PANAMA, Bocas del Toro Province—3 males, 2 females, 10 March, 22 April, November 1953. Canal Zone—1 male, Fort Clayton, 7 December 1953; 2 males, 2 females, Fort Davis, 7 October 1953; 3 males, 1 female, Huile Sia Clara, 12 October 1952; 1 male, 3 females, Loma Boracho, 29 November 1951, 19 June 1952; 1 female, Mindi Dairy, 13 June 1952. Chiriqui Province—1 female, El Volcan, 25 March 1954.

*Discussion*—*Culicoides dasyophrus* Macfie has a wing pattern almost identical with that of *fieldi* but the antennae of *dasyophrus* are much different, segment XI and distal segments at least 1.5 times as long as X and those proximad. The antennae of *fieldi* are much like those of the closely related *benarrochei* Ortiz, *glabellus* n. sp., *leoni* Barbosa and *reevesi* Wirth, but the presence of two separate, post-stigmatic pale spots in cell R<sub>5</sub> with the posterior one located distinctly proximad of the anterior one is characteristic only of *fieldi* and *benarrochei*. *Benarrochei* can be separated from *fieldi* by its shorter second palpal segment (9-13 as long as third), antennal segments XI, XII, XIII and XIV subequal in length and by the presence of a distinct pale spot in front of the mediocubital fork. The long ventral lobe on the male paramere is diagnostic of *fieldi*.

*Culicoides reevesi* Wirth

(Figure 4)

*Culicoides reevesi* Wirth, 1952, Univ. California Pub. Ent. 9: 193 (female; California; fig. wing).

*Characters of Female.* Length of wing 0.69 mm.

Head: Eyes narrowly separated, with long interfacetal hairs. Antenna with flagellar segments in proportion of 14:11:12:15:15:14:14:15:12:11:15:16:25, antennal ratio 0.72; distal sensory tufts present on segments III, VIII-X. Palpal segments in proportion of 7:19:18:6:8, third segment slightly swollen, 2.0 times as long as greatest breadth, with a small, very deep sensory pit. Mandible with 14 teeth.

Thorax: Mesonotum subshining brown, with very indistinct pattern consisting of a sublateral pair of narrow darker brown bands. Scutellum dark brown in middle, slightly paler on sides; postscutellum and pleuron dark brown. Legs pale brown; fore and mid-femora with subapical, all tibiae with sub-basal and hind tibia with apical, indistinct pale rings; tarsi pale; hind tibial comb with 4 spines, the longest one next to the spur.

Wing: Pattern as figured; the common, poststigmatic pale spot large, extending caudad nearly to vein  $M_1$ , the distal pale spot in cell  $R_5$  large and rounded, nearly filling apex of cell but not attaining wing margin; two pale spots in cell  $M_1$ ; one pale spot each in apices of cell  $M_2$ , cell  $M_1$  and anal cell, the spot in anal cell broadly attaining wing margin and extending along margin nearly to base of cell, the pale spot in cell  $M_4$  filling apex of cell; a pale spot lying ahead of mediocubital fork and another lying behind medial fork. Macrotrichia sparse in extreme apices of cells  $R_5$ ,  $M_1$  and  $M_2$ ; costa extending to 0.58 of distance to wing tip.

Abdomen dark brown, cerci yellowish; spermatheca one, sub-spherical, measuring 0.053 by 0.034, the entrance of the duct sclerotized for a considerable distance. (Redescribed from a paratype from State Elk Refuge, Kern Co., California).

*Male.* Unknown.

*Distribution*—California.

*Specimens examined*—CALIFORNIA: Holotype female, 1 female paratype, Bakersfield, Kern County, 28 August 1946, B. Brookman, biting man; 2 female paratypes, State Elk Refuge, Kern County, 11 July 1946, B. Brookman, biting man; 1 female, Bartlett Mountain, Lake County, 17 July 1941, A. W. Lindquist, biting man; 1 female, Big Sur State Park, Monterey County, 23 July 1954, W. McDonald, biting man at dusk.

*Discussion*—The wing markings of *revesi* are very similar to those of *glabellus* and *leoni*, but the antennal segments resemble in their proportions those of *fieldi*, in which segment XII is shorter than XI. In *fieldi*, however, the wing is hairier, the poststigmatic pale spots in cell  $R_5$  are more or less separated, the third palpal segment is only 1.8 times as long as broad and the antennal ratio is much greater (0.85).